



ARGONNE RESEARCH SAVED NUCLEAR POWER INDUSTRY \$1 BILLION

THE CHALLENGE

Boiling water reactors (BWR), which comprise roughly one-third of U.S. nuclear power plants, are protected by a steel-lined containment building reinforced with concrete. If an accident occurs resulting in melting of the reactor core, the corium that arises could migrate outside the vessel and introduce damaging radioactive material to the environment or near people.

In the wake of a severe accident, like the one that happened at Japan's Fukushima Daiichi plants in 2011, the U.S. Nuclear Regulatory Commission asked BWR operators to reinforce domestic plants or vent them differently to minimize the effect of unlikely but potential radioactive leaks. This new safety requirement—and the resulting plant modifications that appeared necessary for compliance—seemed to spell an

inevitable shut down of many BWR plants or about \$50 million per plant to update them.

THE INNOVATION

Engineers at the U.S. Department of Energy's (DOE) Argonne National Laboratory solved the problem after spending years simulating the process of a reactor core melting. Their research had focused on how corium interacts with concrete, and how that interaction can be halted by flooding a vessel with water.

Researchers showed it was possible to inject water through the BWR vessel while keeping radioactive material inside the containment building. This approach didn't require shutdowns, new equipment or plant modifications. The studies also helped establish parameters for determining when corium had cooled adequately, meaning plant operators would better understand what was happening in cases of severe emergency.

THE IMPACT

Argonne researchers saved the BWRs overall fleet more than \$1 billion in potential modification costs, according to the Nuclear Energy Institute, a nuclear power industry trade association.

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